2005

TEXAS BAYS AND ESTUARIES

MEETING

MARINE SCIENCE INSTITUTE,

THE UNIVERSITYOF TEXAS AT AUSTIN,

PORT ARANSAS, TEXAS

Welcome to the 2005 Texas Bays and Estuaries meeting! This meeting is the first of what we hope to be a long series of events dedicated to understanding the diverse coastal regions of Texas.

A notice board will be set up next to the Visitor Center's office, and a payphone is located near the restrooms. During the meeting, please refrain from smoking in the buildings. Restrooms are located in the Visitor's Center next to the library. Lunch will be served under the laboratory overhang next to the parking lot. Dinner will be served either outside or in the Visitor's Center lobby, depending on the weather. Beer and wine are available at dinner for one ticket (one ticket =$2.00). You must use the tickets, as the bartender will not accept cash. You may wander freely with your drinks, but please do not leave the campus with them.

We hope you enjoy the meeting and look forward to seeing you again in the future.

Tracy Villareal

Marine Science Institute

The University of Texas at Austin

Organized and hosted by the

Marine Science Institute

The University of Texas at Austin

Tracy Villareal, convener

Co-Sponsors:

Texas A&M Sea Grant College Program

Coastal Bend Bays Foundation

Port Aransas Chamber of Commerce

City of Port Aransas

Lunch: Robert's of UTMSI (Cafeteria)

Dinner: Uncle Fred's (Aransas Pass, Texas)

Acknowledgements:

Student volunteers. Thank them if you see them!

Craig Aumack, Lucia Carreon, Megan Fencil, Terry Palmer, Marc Russell, and Afonso Souza

Texas Bays and Estuaries Meeting Program

Weds, 20 April 2005
Registration- Plantation Suites
5:00 – 7:00 pm

Thursday, 21 April 2005

0800 – Registration, Visitor's Center Lobby, UTMSI, Pt. Aransas, Texas

0830 - Welcome and opening remarks

0845 – Keynote Address, **Senate Bill 3: Implications for the Environment**. Andrew Sansom, Rivers System Institute, Texas State University

0915 – **Bays in Peril: Assessing the Potential Loss of Freshwater Inflows to Texas' Estuaries.** Norman D. Johns, National Wildlife Federation. Warren Pulich, Texas State University.

0930- **Response of surface water salinity, salt marsh soils, and vegetation to increased freshwater inflows.** Margaret Forbes, University of Texas Marine Science Institute; Heather Alexander, University of Kentucky; Kenneth Dunton, University of Texas Marine Science Institute.

0945- **Application of the ECOS^{2}T-Aquatic Model to the San Antonio River System.** W. Michael Childress, Cade L. Coldren, and Terry McLendon. MWH Global, Inc.

1000 – Break

1030 – Toward integrated ecological coastal water quality monitoring in Texas: The Good, The Bad and The Ugly. James Simons, Texas Parks and Wildlife Department, Corpus Christi, TX

1045- Evidence of seawater circulation through coastal sediments of Nueces Bay, Texas. J.A. Breier and H.N. Edmonds, The University of Texas at Austin Marine Science Institute.

1100- **Temporal and Spatial Variability in Estuarine Ecosystem Function: Estimated using Net Ecosystem Metabolism.** Marc Russell, University of Texas at Austin Marine Science Institute

1130- Effects of hydrology and urbanization on the abundance and distribution of shorebirds on the Ella Barnes Wetland, Oso Bay, Corpus Christi, Texas. Leslie C. Smith, Elizabeth H. Smith, and Kim Withers; Center for Coastal Studies, Texas A&M University-Corpus Christi

1145- **LUNCH**. Provided under the overhang next to the parking lot. Follow the signs.

1300**- The Regional Coastal Assessment Program for South Texas**. Brien A. Nicolau, Alex X. Nunez, Erin M. Albert Center for Coastal Studies, Corpus Christi, Texas; Jefferson N. Childs, Minerals Management Service, Anchorage, Alaska

1315 - **Sediment Quality in Relation to the Macrobenthic Community in the Coastal Bend Bays & Estuaries Program study area**. Alex X. Nuñez and Brien A. Nicolau, Center for Coastal Studies, Corpus Christi, Texas.

1330- **Impact Of A New Tidal Pass On Estuarine Benthic Macrofauna in Corpus Christi Bay, Texas – Progress update.** Terry A. Palmer, Paul A. Montagna and Rick D. Kalke. University of Texas Marine Science Institute, 750 Channelview Drive, Port Aransas, Texas 78373.

1345- **Fishery characterization and management options for live shell bearing mollusks and echinoderms in the Lower Laguna Madre of Texas.** Randy Blankinship, Mark Lingo, Perry Trial, and Roger Bennett, Texas Parks & Wildlife Department, Coastal Fisheries Division.

1400- **Dermowatch: Current Status of Dermo Disease in Oysters of Texas Bays.** Sammy M. Ray, Texas A&M University at Galveston; Tom Soniat, Nicholls State University; Enrique Kortright, Kortright Corporation; and Lance Robinson, Texas Parks and Wildlife Department.

1415- **Mapping of changes in oyster reef extent from 1913 to 2003 in Lavaca Bay, Texas.** Josh Harper and James Simons, Texas Parks and Wildlife Department; Tim Dellapenna and Jason Bronikowski, Texas A&M

University-Galveston; William Sager and Mary Patch, Texas A&M University-College Station .

1430- **A modified assay to determine hemolytic toxin variability among *Karenia* clones isolated off the Texas coast.** T. Neely and L. Campbell, Texas A&M University, College Station.

1445-Break

1515- **Step-Children of the TCOON Project.** John S. Adams Division of Nearshore Research Texas A&M – Corpus Christi.

1530- **The Texas Coastal Ocean Observation Network and the Texas Height Modernization Project.** Gary Jeffress, Division of Nearshore Research, Texas A&M University-Corpus Christi.

1545- **Artificial Neural Network modeling for Texas bays and estuaries.** Philippe E. Tissot, Division of Nearshore Research, Texas A&M University-Corpus Christi.

1600- **Multi-Criteria Evaluation of Oil and Gas Exploration in Texas State Coastal Waters Using Geographic Information Systems.** Sarah P. Bernhardt, Bianca Whitaker, Himanshu Grover, Zhenghong Tang, Colin Spence & Samuel Brody, Texas A&M University, College Station.

1615- **Texas Abandoned Crab Trap Removal Program.** Artussee D. Morris. Texas Parks and Wildlife Department, Coastal Fisheries Division.

1630- **Wave Estimates in a Shallow Estuary: Trinity Bay, Galveston Texas.** K. Dupuis & A. Anis, Department of Oceanography, Texas A&M University, Galveston

1730 - 2000 – Poster session, BBQ dinner and cash bar at the UTMSI Visitor Center. Presentors should be at their posters from 1900-2000.

Friday, 22 April 2005

0830- **Preliminary observations of a seagrass fertilization experiment in the Lower Laguna Madre**. Hudson DeYoe and Joe Kowalski. Center for Subtropical Studies, University of Texas – Pan American; Edinburg, TX

0845- **Canopy dynamics in a selected *Halodule wrightii* (shoal grass) meadow in Lower Laguna Madre, Texas: Are Laguna Madre seagrass canopies stratified and what does it mean if they are?** Joseph L. Kowalski and Terry C. Allison. The University of Texas - Pan American, Department of Biology. 1201 West University Dr. Edinburg, Texas 78539

0900- **Identifying symptoms of stress in seagrass systems.** Troy Mutchler, The University of Texas at Austin, Marine Science Institute; Andrea Kopecky, The University of Texas at Austin, Marine Science Institute; Ken Dunton, The University of Texas at Austin, Marine Science Institute

0915- **What does fishery monitoring measure?** Robert W. McFarlane, McFarlane & Associates, Houston, TX.

0930- **Effects of environmental variation and feed energy on juvenile red drum (*Sciaenops ocellatus*) performance: Preliminary results.** Lance P. Fontaine, William H. Neill, Delbert M. Gatlin, III., John C. Wilson, Texas A&M University, Department of Wildlife and Fisheries Sciences; Robert R. Vega, Texas Parks and Wildlife Department, CCA/CPL Marine Development Center.

0945- Break

1015- **Aspects in life history of young-of-the-year tarpon, *Megalops atlanticus* Valenciennes, in northwestern Gulf of Mexico estuaries.** William Dailey, Texas A&M University; André M. Landry, Jr., Texas A&M University.

1030- **Environmental predictors of bottlenose dolphin core feeding densities in Galveston Bay, Texas.** Paula Moreno, TAMU, Wildlife and Fisheries Sciences *and* TAMUG, Department of Marine Biology; Michael Mathews, TAMU, Department of Mathematics; Bernd Würsig, TAMU,

Wildlife and Fisheries Sciences *and* TAMUG, Department of Marine Biology

1045- **Genetic studies for aquaculture and stock-enhancement of red drum (*Sciaenops ocellatus*)** L. Ma, E. Saillant, and J. R. Gold, Center for Biosystematics and Biodiversity, Texas A&M University, College Station, Texas 77843-2258 USA

1100- **Catch-and-release mortality of spotted seatrout, *Cynoscion nebulosus*.** Jason T. James, Gregory W. Stunz, David A. McKee, Texas A&M University – Corpus Christi

1115- Southern Flounder session
Convenors: Dr. Joan Holt, The University of Texas at Austin Marine Science Institute & Ivonne Blandon, Texas Parks and Wildlife.

1125- **Southern flounder habitat in the estuaries of North Carolina,** John Miller, North Carolina State University, 303 College Circle, Morehead City, NC 28557.

1145- **Age and growth of flounder (Paralichthys spp.) larvae immigrating through the Aransas Pass Texas tidal inlet.** Scott A Holt, University of Texas at Austin, Marine Science Institute, 750 Channel View Drive, Port Aransas, Texas 78373.

1205- **Identification of nursery habitat for juvenile southern flounder, *Paralichthys lethostigma*, in Aransas Bay, Texas.** Suraida Nañez-James, Texas A&M University, Corpus Christi; Gregory Stunz, Texas A&M University, Corpus Christi; Scott Holt, University of Texas at Austin, Marine Science Institute; Jay Rooker, Texas A&M University at Galveston.

1225- **Lunch**

1345- Status and trends of the southern flounder (Paralichthys lethostigma) in Texas coastal waters. Mark R. Fisher, Coastal Fisheries Division, Texas Parks and Wildlife, Rockport.

1405- **Enhancement of Southern Flounder (*Paralichthys lethostigma*) in Texas Coastal Waters: Planning for a New Challenge.** Paul Silva, Robert

R. Vega and Ivonne R. Blandon. Texas Parks and Wildlife Department, Coastal Fisheries Division.

1425- **Spawning and Rearing Southern Flounder (Paralichthys lethostigma).** G. Joan Holt, University of Texas at Austin, Marine Science Institute, 750 Channel View Drive, Port Aransas, Texas 78373.

1445- **Sex Determination in Southern Flounder: Considerations for Aquaculture and Stock Enhancement.** Harry V. Daniels, J. A. Luckenbach, J. Godwin and R.J. Borski, North Carolina State University, Department of Zoology.

1505- Break

1535- Round table discussion on natural populations, new recruits, and the pros and cons of stocking southern flounder in Texas.

1630 – close of meeting

ALPHABETICAL LIST OF ABSTRACTS

Step-Children of the TCOON Project. John S. Adams Division of Nearshore Research Texas A&M – Corpus Christi.

The Division of Nearshore Research (DNR) at Texas A&M University – Corpus Christi (TAMUCC) operates and maintains upwards to 60 monitoring stations along the Texas coast. Sponsorship of the various monitoring platforms includes the Texas General Land Office(TGLO), the Texas Water Development Board(TWDB), the U.S. Army Corps of Engineers(USCOE), the National Ocean Service(NOS), the National Weather Service(NWS), the Ports of Houston and Corpus Christi(POHA)(POCCA), the City of Corpus Christi(CCC), Environmental Protection Agency(EPA), the Guadalupe Blanco River Authority(GBRA), and various private surveying and engineering firms. This presentation will spotlight those projects that are made possible and enhanced by the establishment of the TCOON infrastructure.

Multi-Criteria Evaluation of Oil and Gas Exploration in Texas State Coastal Waters Using Geographic Information Systems. Sarah P. Bernhardt, Bianca Whitaker, Himanshu Grover, Zhenghong Tang, Colin Spence & Samuel Brody, Texas A&M University, College Station.

Human populations concentrated in coastal areas create a menagerie of users, threats and subsequent use conflicts. One potentially conflicting coastal use is the production and extraction of petroleum products from beneath submerged coastal lands. However, there has been little or no application of multiple criteria decision making and spatial decision support systems tools to evaluate potential sites for oil and gas leases on the coastal zone. We developed and evaluated the usefulness of a site suitability measurement tool to determine the most suitable locations for oil and gas production activities in the coastal margin of Texas. All leased blocks on the Texas coast were given a Cumulative Value Score (CVS) based on eight positive values: aesthetics and access, biodiversity and critical habitat, coastal development, commercial fishing and bio-productivity, historical or cultural sites, marine transportation, recreation and tourism, and research and education. The range of scores was 0 to 2.75, with a possible maximum of

8.0. The scores were significantly different when comparing offshore and inshore areas. They were also significantly different when comparing northern to southern coastal bays. This tool might be modified and used to aid decision-makers in determining the most suitable sites, those with significantly lower use conflicts, for exploiting almost any natural resource.

Seagrass biomass and growth differences between oligotrophic and eutrophic areas of the Lower Laguna Madre. Erin Bieberbach, Hudson DeYoe, and Joseph Kowalski. Center for Subtropical Studies and Biology Dept., University of Texas – Pan American, Edinburg, TX.

Above and below ground biomass and leaf elongation rates were measured during late summer and fall for Thalassia testudinum at an oligotrophic area and a eutrophic area of the Lower Laguna Madre. Leaf, root, short shoot and long shoot biomasses were significantly greater at the oligotrophic site compared to the other site. Leaf elongation rates and leaf length were significantly greater at the eutrophic site. Historical artificial substrate epiphyte data indicates that epiphyte loading is greater at the eutrophic site which may account for the above differences. - POSTER

Fishery characterization and management options for live shell bearing mollusks and echinoderms in the Lower Laguna Madre of Texas. Randy Blankinship, Mark Lingo, Perry Trial, and Roger Bennett, Texas Parks & Wildlife Department, Coastal Fisheries Division.

In 2001, concern was expressed by local citizenry over what was perceived as excess harvest of live mollusks and other intertidal organisms along South Padre Island beaches. In response to these inquires Texas Parks & Wildlife Department's Brownsville Field Office conducted a pilot study to assess harvest pressure, identify targeted species, and compile socio-economic data on the fishery. The study was conducted from November 2002 through December 2004. Survey counts yielded 2169 invertebrates of 24 species with an average of 27 shells/organisms collected per person. The dominate species harvested was thinstripe hermit crab, *Clibanarius vittatus* (85%), followed by virgin nerite, *Neritina virginea* (4%); striped false limpet, *Siphonaria pectinata* (2%); plicate hornsnail, *Cerithidea pliculosa* (2%); and

Atlantic giant cockle, *Dinocardium robustum* (1%). We found that seashell collecting in this area is predominately a winter activity by seasonal visitors for arts and crafts or personal collections. Fishery participants were not harvesting for sale or commercial trade and survey respondents indicated no preference for a specific type of shell or organism. Potential impacts of harvest activity are presented and management options are suggested.

Evidence of seawater circulation through coastal sediments of Nueces Bay, Texas. J.A. Breier and H.N. Edmonds, The University of Texas at Austin Marine Science Institute.

Measurements of dissolved Ra isotopes and geophysical surveys using sediment resistivity profiling were used to investigate the exchange of water between coastal sediments and Nueces Bay, Texas. Water, dissolved salt, and radium mass balances for a 195 day period from fall 2002 through spring 2003 indicate there is a significant source of dissolved Ra to Nueces Bay which can not be accounted for by tidal exchange, river input, or diffusion from bay bottom sediments. In the case of Ra226 this source is 110% of the combined tidal, river, and diffusive inputs. Follow-on synoptic surveys of radium isotopes and sediment resistivity measurements at the head of Nueces Bay have revealed localized areas of elevated Ra activity. These findings suggest that there is a significant submerged source of dissolved Ra at the head of Nueces Bay being delivered by brackish or saline waters. A possible mechanism for this process is a density driven convection cell of recirculating seawater connecting the salt marsh and the head of Nueces Bay and caused by seasonal tidal inundation and high evaporation rates. This has potential implications for bay nutrient budgets and fresh water inflow requirements.

Application of the ECOS^{2}T-Aquatic Model to the San Antonio River System. W. Michael Childress, Cade L. Coldren, and Terry McLendon. MWH Global, Inc.

Management of estuarine systems should include consideration of terrestrial and aquatic watersheds which are the main sources of water, nutrients, contaminants and other materials. ECOS^{2}T-Aquatic (EA) is a new computer

model which simulates hydrological linkages and transport between terrestrial ecosystems and receiving streams, rivers, reservoirs, and estuaries. EA is designed to interact directly with the EDYS/ECOS^{2}T terrestrial ecosystem model, which has been applied widely in the US in addressing land management issues. Hydrological dynamics in EA are essentially a mass-balance model for water flows and chemistry between hydrological units lying in the watershed. Ecosystem dynamics include nutrient transport and utilization, primary and secondary production, and submodels for six primary producer types, four microbial types, eleven small invertebrate groups, and four fish groups. Linked EA and EDYS models have been recently applied to the San Antonio River system and watershed, ranging from Cibolo Creek north of San Antonio down to San Antonio Bay. This application implements eight freshwater and two bay segments corresponding to USGS gaging stations, as well as 25 terrestrial community types in the watershed. The objective of this application is to investigate impacts of disturbances and development in different parts of the watershed on water and habitat quality in the river and bays. Preliminary simulation results reflect the importance of timing and volume of river discharges on productivity and structure of estuarine plankton communities.

Texas Tidal Stream Aquatic Life Use Attainability. Cindy H. Contreras, Adam Whisenant, Janet Nelson, and Jim Tolan; Texas Parks and Wildlife Department, Austin, Texas.

Tidal streams in Texas are components of estuaries that provide vital habitat such as nursery grounds for many aquatic organisms, including economically important species like shrimp and game fish. Texas has no accepted methodology for evaluating the aquatic life use (ALU) of a tidal stream, a designation that has regulatory consequences such as driving the levels of contaminants permitted in wastewater discharges. TPWD recently completed field work for a multi-year study of five tidal streams, having sampled fish, invertebrates, habitat, flow, and water quality to set the ALU of these streams. Study streams, selected because of concern over low dissolved oxygen measurements, are Tres Palacios Creek Tidal, Garcitas Creek Tidal, and Cow Bayou Tidal. Reference streams are West Carancahua Creek Tidal and Lost River. This poster will relate early results

from seine samples taken at the mouth of Cow Bayou from April 2003 through November 2004. Forty-two nekton taxa are represented. - POSTER

Aspects in life history of young-of-the-year tarpon, *Megalops atlanticus* Valenciennes, in northwestern Gulf of Mexico estuaries. William Dailey, Texas A&M University; André M. Landry, Jr., Texas A&M University.

Despite well-developed recreational tarpon fisheries in Louisiana and Mexico, little is known regarding tarpon population dynamics in the northwestern Gulf of Mexico. Recruitment potential and habitat preference of young-of-the-year (y-o-y) tarpon in Texas waters have remained enigmas. Monthly bag seine surveys for tarpon were conducted from August 2004 through January 2005 at three estuarine sites in Galveston, Matagorda and Jackson Counties, Texas. Peak abundances were observed in November with the capture of 37 age-0 tarpon, and total captures were 91. Arrival and departure of y-o-y were observed in September and January, respectively. Examination of length-frequency distributions yielded three distinguishable cohorts and, consequently, evidence of multiple recruitment phases. Standard length ranged from 40 to 146 mm with mean length of 67.9 mm. Tarpon ranging from 40 to 75 mm comprised approximately 67% of the total catch. Abundances differed significantly between collection sites ($F_{2,17}$=5.022, p=0.021), with Matagorda County yielding highest catches. Matagorda and Jackson sites were characterized as *Spartina*-dominated low mesohaline tidal creeks distal to an estuary mouth. The Galveston site was characterized as *Spartina-Sporobolus*-dominated ephemeral polyhaline saltmarsh pond proximal to an estuary mouth. Salinities for the eighteen collections ranged from 5 to 24 ppt. Water temperatures and dissolved oxygen concentrations ranged from 11.5 to 31.2 C, and 3.1 to 8.6 mg/L, respectively. No relationships were found between y-o-y abundances and hydrographic parameters.

Sex Determination in Southern Flounder: Considerations for Aquaculture and Stock Enhancement. Harry V. Daniels, J. A. Luckenbach, J. Godwin and R.J. Borski, North Carolina State University, Department of Zoology.

Southern flounder (*Paralichthys lethostigma*) exhibit sexually dimorphic growth. Females grow 2-3 times faster than males and attain a larger size in both natural and cultured populations. This growth differential has resulted in an unintentional selective harvest of females from the fishery. Aquaculturists are interested in the production of all-female populations to maximize economic returns. The mechanisms that control sex differentiation in southern flounder are poorly understood. Based on studies of gonadal histology and aromatase cytochrome P450 ($P450_{arom}$) gene expression, sex determination in southern flounder is temperature sensitive and occurs between 75-120 mm, much later than the Japanese flounder (*P. olivaceous*). Comparison of $P450_{arom}$ intron sequences within and between different populations revealed substantial inter-individual variation that may affect sex determination responses. Recent studies of gynogenetic flounder indicate that culture conditions, such as stocking density and light intensity, may also affect sex ratios of cultured fish. A more complete understanding of the factors affecting sex differentiation in southern flounder is needed to assist culturists in the production of all-female stocks and to guide fisheries managers in the release of appropriate sex ratios in stock enhancement efforts.

Preliminary observations of a seagrass fertilization experiment in the Lower Laguna Madre. Hudson DeYoe and Joe Kowalski. Center for Subtropical Studies, University of Texas – Pan American; Edinburg, TX

To determine if nitrogen or phosphorus limit seagrass (Thalassia testudinum) growth in the Lower Laguna Madre, a seagrass fertilization experiment was initiated in July 2004. Nitrogen (N), phosphorus (P), N+P and control plots were established at low and elevated nutrient sites in the lagoon. Following fertilization, seagrass response was assessed by leaf growth measurements using the blade marking method. No significant response of any of the fertilization treatments in comparison to the control was seen. However, there was a clear difference between the two sites. The lack of response to

nitrogen fertilization is contrary to a previous nitrogen fertilization study conducted in the same locale.

Wave Estimates in a Shallow Estuary: Trinity Bay, Galveston Texas. K. Dupuis & A. Anis, Department of Oceanography, Texas A&M University, Galveston

Trinity Bay, Galveston, Texas is an estuary with the primary source of freshwater from the Trinity River, and the primary source of saline waters from an inlet to the Gulf of Mexico. There is relatively little knowledge of physical dynamics in the Galveston Bay system. As part of an ongoing Texas Sea Grant project to investigate the role of physical processes on biogeochemistry, in-situ measurements of pressure (P) and current velocity components (U and V) were carried out with two, nearly collocated, current meters (an acoustic Doppler velocimeter, ADV, and an acoustic Doppler current profiler, ADCP). Both instruments measure pressure and currents, however the ADV measures currents at a single point, while the ADCP provides a vertical profile of the currents. The instruments were mounted to a frame and lowered to the bottom (depth 2.5-3m) to sample the full diurnal cycle during spring and neap tides of each season. The measurements were used to estimate surface-wave heights and directions in Trinity Bay, Texas, by utilizing the PUV method. Specifically, wave heights and wave periods were estimated from spectral analysis of the pressure signal. Wave direction was estimated from the difference in speed of the orbital wave velocity components and compared to on board wind measurements. Future work on this project will include comparison of the influence of wave dynamics and tides on the bottom boundary layer and understanding of the development of waves in a shallow estuary using a theoretical model.

Overview of Programs Conducted by Texas Parks & Wildlife Department, Coastal Fisheries Division. Justin Esslinger, Texas Parks & Wildlife Department.

The Coastal Fisheries Division of the Texas Parks & Wildlife Department (TPWD) manages marine fishery, habitat and water resources of Texas' four million acres of saltwater, including the bays and estuaries out to nine nautical miles in the Gulf of Mexico. Coastal Fisheries Division

management strategies are directed toward optimizing the long-term utilization of Texas marine resources. Management is designed to 1) maintain fisheries populations at levels necessary to ensure sustainable stocks of commercially and recreationally important species, 2) focus on habitat conservation and restoration, 3) coordinate water-related issues, including assuring adequate instream flows for Texas' rivers and freshwater inflows for bays and estuaries. The purpose of this poster is to present an overview of current Coastal Fisheries Division coastwide sampling and special research projects. It is hoped that increased awareness of TPWD projects will promote cooperative interactions (i.e. data sharing and reduced duplication of research effort) with other agencies, universities and stakeholders. - POSTER

Sea-level rise and the loss of marsh habitat in Galveston Bay: A GIS-based planning tool. Rusty Feagin, Zach Vernon, Cody Cutrell, Gina Yaklin, and Michael Morrow. Texas A&M University at College Station

Relative sea-level rise is slowly drowning our coastal ecosystems and habitats. Salt marshes are particularly vulnerable because the habitat exists in zones that are dependent upon water level. Sea-level rise is expected to force marshes to migrate to adjacent upland habitats, but often this cannot occur as developments, bulkheads, or steeper slopes preclude marsh migration. We developed a GIS-based planning tool that was utilized to predict potential marsh loss in Galveston Bay under various Intergovernmental Panel on Climate Change (IPCC) rise scenarios. We built this tool as part of a undergraduate class project, where the inquiry was integrated into the teaching curriculum, allowing the students to participate in primary research. Although more work is needed, particularly in gaining an understanding of how sedimentation affects marsh elevation at the Galveston Bay sites, the tool is designed to be easy-to-use for scientists who may have data from other coastal locations. The final results showed that the areal cover of salt marsh significantly declined for the Galveston Bay locations, even under moderate climate change scenarios. - POSTER

The effects of propeller scarring on benthic infaunal communities. Ryan L. Fikes, Dana Burfeind, & Greg W. Stunz. Texas A&M University-Corpus Christi

Seagrass is an important habitat type for a variety of marine organisms and ecosystem functions. Damage to these areas from boat propellers has become a problem in many areas. The purpose of this study was to examine the effects of propeller scarring on benthic infauna abundance in Redfish Bay, TX. We examined infauna abundance inside and at varying distances away from the scar at 10 replicate sites. At each site we sampled 5 distinct zones: scar, scar edge, 0.5m from scar edge, 1.0m from scar edge, and 2.0m from scar edge. Three replicate benthic samples were collected at each zone during spring 2004 using 10cm PVC corers. Additional replicate cores were taken to measure seagrass shoot density, biomass, and substrate sediment content. Our results showed no significant difference in bivalve and gastropod abundance among zones; however, we found significantly lower polychaete abundance within the propeller scar than at all other zones. These results suggest propeller scars may not affect molluscan abundance but may decrease abundance of polychaetes in seagrass beds. While polychaete abundance is high, as scarring intensities increase overall abundance in seagrass meadows may decrease. The focus of this study was to examine overall infaunal abundance. The next step is to further characterize benthic infauna by examining lower taxons and key indicator species. POSTER

Status and trends of the southern flounder (Paralichthys lethostigma) in Texas coastal waters. Mark R. Fisher, Coastal Fisheries Division, Texas Parks and Wildlife, Rockport.

Fishery-independent monitoring indicates southern flounder occur along the entire Texas coast, but are more abundant along the upper coast. Young-of-the-year are first captured by our bag seines in January. Our trawl surveys encounter them throughout the year, but are most commonly caught from March-August. Recruitment has been cyclic, but slowly declining. Gill net surveys indicate the adult flounder population declined through the mid-1990's but have demonstrated a slow increase in abundance since. Commercial landings have also been in decline since the 1990's despite high value. Recreational landings have also been in decline since the 1990's.

Bycatch studies conducted by TPW indicate shrimp trawl bycatch is the single greatest source of mortality. Approximately 80% of fishing mortality is from bycatch, with 20% from the directed commercial fishery and the sport fishery combined. Male flounder are more vulnerable to bycatch causing sex ratios to shift to more females. The license buy-back program, implemented in 1995, has reduced the number of bay commercial shrimp licenses by 40%. Further reductions in bycatch should result in increased flounder abundance.

Effects of environmental variation and feed energy on juvenile red drum (*Sciaenops ocellatus*) performance: Preliminary results. Lance P. Fontaine, William H. Neill, Delbert M. Gatlin, III., John C. Wilson, Texas A&M University, Department of Wildlife and Fisheries Sciences; Robert R. Vega, Texas Parks and Wildlife Department, CCA/CPL Marine Development Center.

Our previous research has led to the development of an ecophysiological model that can account for much of the variation in growth rates of juvenile red drum (*Sciaenops ocellatus*), as a function of time-varying temperature (Ta), dissolved-oxygen concentration (DO) and food energy-density (FE). Moreover, the model has suggested strategies for managing these variables to increase size and health status of hatchery-produced juvenile red drum being released by Texas Parks and Wildlife for stock enhancement. Preliminary results obtained from the current phase of our research support model projections of limiting effects of FE and DO and a controlling effect of Ta on growth, together with interactions of these factors on growth. However, fish in cyclical Ta and DO environments did not display growth rates or metabolic capacities greater than those in constant environmental regimes with near-optimum values of Ta and DO, as predicted by the model. Further research is underway to better resolve these findings and to test them in hatchery-pond settings. Results from this research effort will benefit a number of users and stakeholders, including state and federal agencies responsible for managing marine resources, commercial red drum producers, as well as the scientific and lay public.

Response of surface water salinity, salt marsh soils, and vegetation to increased freshwater inflows. Margaret Forbes, University of Texas Marine Science Institute; Heather Alexander, University of Kentucky; Kenneth Dunton, University of Texas Marine Science Institute.

Salt marsh characteristics are extremely variable both temporally and spatially, making effects of restoration efforts difficult to evaluate. Restoration in the Nueces Delta, a south Texas salt marsh, has increased the frequency, duration, and pattern of freshwater inflows to hypersaline areas. Since 1995, we measured tidal creek and porewater salinity, dissolved inorganic nitrogen, soil moisture, and vegetation at several stations in the delta. We related streamflow, precipitation, evaporation, and bay salinity to these parameters at each station. Nueces Bay salinity decreased significantly when Nueces River mean flow exceeds 10 m^3s^{-1} for 10 days (8.6×10^6 m^3). Massive flooding between July and October 2002 destroyed much vegetation and decreased soil salinities. Vegetation has been slow to recover at high marsh locations, despite depressed soil salinities. The annual, *Salicornia bigelovii,* replaced *Monanthocloe littoralis* and *Distichlis spicata* as the dominant species at both high marsh stations. In contrast, *Borrichia frutescens* replaced *Salicornia virginica* as the dominant species in the lower marsh, as reflected by changes at a station located on the marsh edge close to Nueces Bay.

Mapping of changes in oyster reef extent from 1913 to 2003 in Lavaca Bay, Texas. Josh Harper and James Simons, Texas Parks and Wildlife Department; Tim Dellapenna and Jason Bronikowski, Texas A&M University-Galveston; William Sager and Mary Patch, Texas A&M University-College Station .

Oyster reefs are an important resource in Lavaca Bay, Texas, a sub-bay of the Matagorda Bay System. Their health and abundance is important to both the local ecology and economy. Texas Parks and Wildlife Department (TPWD) and Texas A&M University have jointly conducted a side-scan sonar and sub-bottom profile survey of Lavaca Bay to map the oyster reefs, as well as anthropogenic impacts such as pipelines, dredged channels, and structural debris. The areal extent of oyster reef has markedly declined since the first detailed mapping effort by Moore and Danglade in 1913. Several of the major contiguous historical reefs now exist only as smaller broken

patches. However, there are new areas of reef created through the deposit of dredge spoil and through mitigation efforts. Analysis of these historical trends combined with biological datasets such as the TPWD Coastal Fisheries database, may assist in future management decisions and restoration efforts.

Spawning and Rearing Southern Flounder (*Paralichthys lethostigma*). G. Joan Holt,, University of Texas at Austin, Marine Science Institute, 750 Channel View Drive, Port Aransas, Texas 78373, joan@utmsi.utexas.edu

Adult southern flounder were collected in fall 2003 and 2004 as they were moving offshore to spawn. Fish were held in recirculating tank systems either in a natural ambient situation, or controlled temperature/daylength to simulate spawning conditions. Spawning began in December and continued regularly through February in the natural ambient tank, producing 40,000 to 900,000 eggs /spawn. Fish held for 1 year and programmed to spawn in December produced eggs regularly but fertilization rates were low. Larvae reared at the spawning temperature (18-19 C) were fed rotifers for 23 days and then artemia until they were weaned at approximately 30 day post hatch. Experiments to evaluate temperature tolerance of first feeding and 7 day post-hatch larvae established they had very narrow temperature tolerance with poor survival in temperature changes greater than 2 0 C above or below that of spawning.

Age and growth of flounder (Paralichthys spp.) larvae immigrating through the Aransas Pass Texas tidal inlet. Scott A Holt,, University of Texas at Austin, Marine Science Institute, 750 Channel View Drive, Port Aransas, Texas 78373, sholt@utmsi.utexas.edu

Southern and Gulf flounder both spawn in offshore waters and the larvae are transported to the coast and through tidal inlets by coastal water currents. Immigration of offshore spawned larvae through tidal inlets and into estuarine nursery grounds is a critical stage in the early life history of many "estuarine dependent" marine species. Immigration rates are often highly sporadic and the driving mechanisms are often not well known. We

collected *Paralichthys* spp. flounder larvae immigrating through the Aransas Pass tidal inlet on each flood tide during the January to March immigration period. Immigrating larvae ranged from 6 to 12 mm standard length. Most were in the process of metamorphosis and 20-40 days in age. Size at age was highly variable and did not clearly correlate with metamorphic stage or date. Hatch dates of immigrating larvae spanned a wider range of dates than the hatch dates of post-settlement juveniles in the estuary, suggesting differential mortality of immigrants over time.

Catch-and-release mortality of spotted seatrout, *Cynoscion nebulosus*.
Jason T. James, Gregory W. Stunz, David A. McKee, Texas A&M University – Corpus Christi

The spotted seatrout (*Cynoscion nebulosus*) is one of the most sought after marine sport fish in Texas and the Gulf Coast. The popularity of spotted seatrout in Texas correlates into economic gain for many coastal communities. Despite the benefits created by the fishery, increasing fishing pressure has raised concerns over its sustainability. As a result, new management regulations that are dependent upon the release and post-capture survival of spotted seatrout have been enacted. This study examines mortality associated with hook-and-line captured spotted seatrout by recreational anglers as a function of season and anatomical hooking location, and live-release tournaments. From July 2004 to February 2005, 336 spotted seatrout ranging from 220 – 555 mm were captured on hook-and-line in Aransas and Corpus Christi Bays and maintained in field enclosures (3.5 m^3) for 72 hours. A higher mortality rate was found in summer (10%) than fall and winter (both 0%). Anatomical hooking location was a major factor influencing mortality. Fish hooked in the esophagus and gills had mortality rates of 94% and 50%, whereas fish hooked in the mouth and externally had mortality rates of 10% and 0%, respectively. From February 2004 to February 2005, 998 spotted seatrout were captured in six live-release tournaments. Overall tournament mortality was 28% with initial and delayed mortality rates of 14% and 16%, respectively. These data suggest that current catch-and-release management regulations for spotted seatrout are a viable management strategy.

The Texas Coastal Ocean Observation Network and the Texas Height Modernization Project. Gary Jeffress, Division of Nearshore Research, Texas A&M University-Corpus Christi.

The Division of Nearshore Research (DNR) at Texas A&M University-Corpus Christi operates the Texas Coastal Ocean Observation Network (TCOON.) The network collects near real-time data, including water level, wind speed & direction, barometric pressure, water temperature, and air temperature from stations placed in bays and estuaries along the Texas coast. TCOON provides this critical data to many users, including those in the commercial shipping industry, marine construction, water-land boundaries, recreational boaters, and those responsible for marine safety and emergency evacuation in the event of a hurricane. The current status of TCOON will be presented in this session.

The Texas Height Modernization program has just received funding through NOAA's National Geodetic Survey. Height Modernization is a series of activities designed to advance and promote the determination of elevations by GPS surveying, rather than by spirit leveling. It includes research and development activities seeking to improve the determination of geometric elevations by GPS surveys as well as activities seeking to improve the determination of geoid height. It includes activities leading to improved height determination both for the static surveyor and for the moving navigator. The effect of Height Modernization on coastal areas will be discussed.

Bays in Peril: Assessing the Potential Loss of Freshwater Inflows to Texas' Estuaries. Norman D. Johns, National Wildlife Federation. Warren Pulich, Texas State University.

The importance of freshwater inflows to estuaries, including those in Texas, has been well established generally. However, evaluating the adequacy of current or future inflows has been hampered by difficulties in quantifying the volumes, frequency, and timing of such inflows. In this research we: 1) establish benchmark hydro-ecological criteria based on natural flow patterns and life-cycle considerations of important species; and 2) assess future inflows if all of the existing state-issued freshwater withdrawal permits are utilized. Two benchmark inflow criteria were developed with the first being

for spring/early summer period inflow pulses associated with productivity maintenance. The second was a very low inflow, drought-survival criteria wherein the goal becomes avoiding reproductive failure and loss of species. Predicting freshwater inflows to our Texas estuaries was accomplished with the state's water availability models (WAMs). Scenarios for current conditions and a future scenario, which assumes full use of all existing water permits and 50% reuse of wastewater, were utilized. The future scenario seems reasonable given predicted population growth, a developing market for water permits, and the growing interest in large-scale wastewater reuse projects. While most of our seven major estuaries are currently healthy, under the future scenario five will face serious challenges due to loss of adequate freshwater inflow.

Canopy dynamics in a selected *Halodule wrightii* (shoal grass) meadow in Lower Laguna Madre, Texas: Are Laguna Madre seagrass canopies stratified and what does it mean if they are? Joseph L. Kowalski and Terry C. Allison. The University of Texas - Pan American, Department of Biology. 1201 West University Dr. Edinburg, Texas 78539.

The canopy of *Halodule wrightii* is the preferred refuge and nursery for recreationally important sciaenid fish hatchlings and for commercially important juvenile shrimp and crab species. A large *H. wrightii* meadow was studied between 1995 through 1997 in Lower Laguna Madre (LLM) at 1.2 m depth. Shoots produced 2.58 leaves shoot^{-1} while shoot density ranged between 3942 (January 1997) and 9672 (April 1996) shoots m^{-2}, each with little seasonal expression. Highest values were found in August 1995 and July 1996 while lowest values were found in January and February 1996. Leaves per shoot and shoot density combined to produce a significant seasonal pattern in areal leaf density. Leaf density, rather than shoot density alone may potentially be a more important structural refuge factor. Leaf length measurements were divided into 10 cm length segments. The 0 to 10 cm leaf class accounted for 58% of all observations, followed by 39% for the 11 to 20 cm size class. This size class distribution may influence natant fauna microhabitat site selection, a comparatively under-studied detail of the seagrass-faunal landscape.

Genetic studies for aquaculture and stock-enhancement of red drum (*Sciaenops ocellatus*)

Ma, L., E. Saillant, and J. R. Gold, Center for Biosystematics and Biodiversity, Texas A&M University, College Station, Texas 77843-2258 USA

Hypervariable DNA markers (nuclear-encoded microsatellites) were employed to address issues related to the Texas Parks and Wildlife Department (TPWD) stock-enhancement program and to red drum aquaculture. The primary issues under study was the genetic effective size of the breeding population at TPWD hatcheries used in the stock-enhancement program. Results of the study indicated that genetic effective size can be reduced by three factors: (i) the non-contribution to offspring of some of the breeders present in a given broodtank; (ii) the variable contribution to offspring among the breeders that successfully breed in a broodtank; and (iii) the variable production (in number of fingerlings) from each broodtank used in stock enhancement. The last appears to be the easiest and most cost-effective to manipulate relative to maximizing genetic effective size.

What does fishery monitoring measure? Robert W. McFarlane, McFarlane & Associates, Houston, TX.

Fishery-dependent commercial landings data and fishery-independent catch-per-unit-effort (CPUE) coastal fishery monitoring data are assumed to track the annual population fluctuations of numerous estuarine species. This critical assumption is seldom tested. Eight measures of brown shrimp (*Farfantepenaeus aztecus*) and white shrimp (*Litopeneaeus setiferus*) abundance fail to show any significant correlation within Galveston Bay or the Gulf of Mexico. Shoreline bag seine CPUE, bottom trawl CPUE and bay landings are poorly correlated for brown shrimp, white shrimp, or blue crab (*Callinectes sapidus*) in any Texas estuary. The same is true for six fish species in Galveston Bay. The non-motile eastern oyster (*Crassostrea virginicus*), sampled only on known reefs with oyster dredges, is the sole species that provides decent correlations and predictability of future harvests. The one-size-fits-all fishery-independent CPUE random sampling strategy does not appear to fit anything. Estimates of current population

status or trends dependent on CPUE data are unreliable. Mobile, aggregating or schooling organisms have proven to be difficult to monitor.

Southern flounder habitat in the estuaries of North Carolina, John Miller, North Carolina State University, 303 College Circle, Morehead City, NC 28557

The presentation will provide evidence 1) that southern flounder are below carrying capacity and not food-limited, 2) there are vacant, but potentially productive, areas of the estuary that could be stocked and 3) these areas are created by met-driven currents, which vary from year to year, but there seem to be a few (actually 6) discernible patterns. In the workshop, I will discuss the recommendations for how we should proceed in stock enhancement here in NC that came out of our workshop.

Environmental predictors of bottlenose dolphin core feeding densities in Galveston Bay, Texas. Paula Moreno, TAMU, Wildlife and Fisheries Sciences *and* TAMUG, Department of Marine Biology; Michael Mathews, TAMU, Department of Mathematics; Bernd Würsig, TAMU, Wildlife and Fisheries Sciences *and* TAMUG, Department of Marine Biology

Estuaries are productive inshore systems that serve as important nursery grounds, including for bottlenose dolphins. From January to December, 2001, we conducted 367 boat surveys in Galveston Bay. A total of 1,802 dolphins in 262 groups were detected, 56.87 % of which were feeding. Feeding with shrimpers comprised 21.48% of the feeding groups. Two locations amounting to one-fifth of the surveyed area accounted for 94% of the groups. Using a 500 m- resolution grid, we associated dolphin counts and behavior with environmental variables. We used a Generalized Linear Model to evaluate the association of environmental variables with core feeding density (CFD). The strongest effect was distance to the Gulf, which was inversely correlated with density. Interestingly, CFD was positively correlated with number of boats. We identified prime feeding habitat and found that the main feeding cores were stable with time of day and season. These cores were situated in channels, on ferry landings and close to a break in the jetties. This fine-scale study of bottlenose dolphin distribution is

contributing to a better understanding of habitat requirements for coastal dolphins.

Biodiversity of marine molluscs in the Gulf of Mexico. Fabio Moretzsohn and John W. Tunnell, Jr., Center for Coastal Studies/Harte Research Institute, Texas A&M University-Corpus Christi (TAMUCC), fabio@falcon.tamucc.edu

The Harte Research Institute for Gulf of Mexico Studies at Texas A&M University-Corpus Christi is sponsoring a 50-year update of "Bulletin 89". This volume, *Gulf of Mexico-Its Origin, Waters, and Marine Life*, on the state-of-the-science in the Gulf of Mexico (GOM), published in 1954, is still used as a major historical reference for the region. The updated version will be published in five volumes, with one volume dedicated to the Biota of the GOM. A team of more than 100 expert taxonomists from the USA, Mexico and Cuba was assembled to compile the biodiversity of the GOM. This endeavor represents the largest in-depth taxonomic treatment of the whole biota of a large marine ecosystem of this scale. The current known diversity of molluscs alone is almost the same as the known biota of the region 50 years ago, with close to 2,700 molluscan species documented in the GOM. Although the numbers are not yet final, the diversity of molluscs in the GOM can be broken down as follows: Aplacophora-13 species (with seven new species being described); Polyplacophora-39 species; Gastropoda-1,900 species; Cephalopoda-24 species; Bivalvia-670 species; and Scaphopoda-41 species. New records (range extensions), recent descriptions of new species and the inclusion of micromolluscs and deep-water species account for the sharp increase in the known diversity in the region. – POSTER

Texas Abandoned Crab Trap Removal Program. Artussee D. Morris. Texas Parks and Wildlife Department, Coastal Fisheries Division.

Each February since 2002, the Texas Parks and Wildlife Department has conducted a volunteer-based abandoned crab trap removal program in Texas coastal waters. During these events, more than 12,700 volunteer man-hours were expended to remove a total of 17,957 abandoned crab traps. Most, 70%, were removed from the Galveston and San Antonio Bay systems,

6,728 and 5,855 traps respectively. Of the traps removed, 1,213 traps were examined to determine contents and condition. The examined traps contained 2,292 organisms representing 29 species. The most abundant species found were blue crab, *Callinectes sapidus*, and stone crab, *Menippe adina*, 63% and 19% respectively. Sheepshead, *Archosargus probatocephalus*, was the most abundant vertebrate species found and represented 10% of all organisms observed. The strong support for the program from volunteers and the resource benefits of removing these unsightly and wasteful artifacts of the commercial crab fishery justifies continuation of the Texas Abandoned Crab Trap Removal Program well into the future.

Identifying symptoms of stress in seagrass systems. Troy Mutchler, The University of Texas at Austin, Marine Science Institute; Andrea Kopecky, The University of Texas at Austin, Marine Science Institute; Ken Dunton, The University of Texas at Austin, Marine Science Institute

As the global distribution of seagrass habitats has declined, the need for an effective means of detecting ecosystem stress leading to seagrass loss has intensified. Identifying the factors that drive seagrass dynamics, however, has proven to be difficult. In an attempt to determine the most effective variables for assessing seagrass status, we sampled at 40 sites within 2 estuaries in south Texas. At each site, 12 water column, 3 sediment, and 11 vegetation variables were measured and analyzed. Commonly measured variables such as temperature, salinity, and chlorophyll *a* provided little information regarding seagrass status. Water column NH_4, $NO_3^- + NO_2^-$, and PO_4 concentrations were low at all sites (< 2 μM); however, blade C:N ratios (~ 13) suggested that the seagrasses were not nutrient limited. Additionally, drift macroalgae and epiphytes were abundant and may limit light availability. Unless measured continuously, water column variables do not appear to be effective indicators of seagrass status. Measurement of variables that integrate site-specific conditions, such as biomass, shoot density, algal abundance, and C:N ratios are critical to detecting ecosystem stress. Further monitoring should emphasize such integrative indices of plant status to assess long-term changes in seagrass distribution.

Identification of nursery habitat for juvenile southern flounder, Paralichthys lethostigma, in Aransas Bay, Texas. Suraida Nañez-James, Texas A&M University, Corpus Christi; Gregory Stunz, Texas A&M University, Corpus Christi; Scott Holt, University of Texas at Austin, Marine Science Institute; Jay Rooker, Texas A&M University at Galveston

Southern flounder (Paralichthys lethostigma) populations in Texas have been in steady decline. Despite the economic importance of this species, little is known about their juvenile habitat requirements in the Gulf of Mexico. The goal of this project was to determine the temporal and spatial patterns of juvenile southern flounder habitat use. Sampling was conducted from January through July 2004 in the Aransas/Copano estuaries in Texas. The bay complex was divided into three zones from near the tidal inlet to the fresh headwaters of a secondary bay. A beam trawl was used to sample in three areas within each zone in three different habitat types: seagrass (Halodule wrightii), marsh (Spartina alterniflora), and open water (non-vegetated). Flounder showed distinct habitat use patterns with significantly higher densities occurring in marsh and seagrass. Few flounder were collected over open bay bottom. We observed spatial and temporal trends in flounder densities in relation to distances from the tidal inlet. No flounder were captured in the secondary bay sampling zone. We plan to increase sampling frequency during 2005 to further examine density patterns throughout the bay system. Results from this study will provide needed data on juvenile habitat use patterns of newly settled southern flounder. - POSTER

A modified assay to determine hemolytic toxin variability among *Karenia* clones isolated off the Texas coast. T. Neely and L. Campbell, Texas A&M University.

Karenia brevis, a toxic marine dinoflagellate in the Gulf of Mexico, has been implicated as the main causative organism in fish kills, shellfish toxicity and respiratory distress in humans following bloom events. *K.mikimotoi* is a closely related co-occurring species which is toxic when found in other regions of the world's oceans, but to date has not been recognized as toxic in the Gulf of Mexico. There has been increasing evidence to suggest production of a variety of bio-active compounds in addition to brevetoxin derivatives within various *Karenia* clones. The goals

of this study were (1) to determine the if hemolytic toxins are present in both *K. brevis* and *K. mikimotoi*, and (2) to determine if significant differences in production of hemolytic toxins exist among *Karenia* isolates. Using a modified version of the Erythrocyte Lysis Assay (ELA), developed by Eshbach et al., Red Drum erythrocytes were used to detect hemolytic activity from crude algal extracts. Red Drum was selected as the source for erythrocytes because it is endemic to coastal areas throughout the Gulf and is reported to be sensitive to *Karenia* blooms, which makes this species a valid ecological target. Preliminary data has shown that there is markedly higher hemolytic activity among *K.mikimotoi* clones versus *K.brevis*. Although *K. mikimotoi* has not been implicated in fish kills in the Gulf, these results suggest further investigations should be conducted to determine the role of these toxin producers in blooms off the Texas Coast.

The Regional Coastal Assessment Program for South Texas. Brien A. Nicolau, Alex X. Nuñez, Erin M. Albert Center for Coastal Studies, Corpus Christi, Texas; Jefferson N. Childs, Minerals Management Service, Anchorage, Alaska

According to the *Implementation Strategy for the Coastal Bend Bays Plan*, maintaining and or enhancing the quality of water and sediment within the Coastal Bend are primary goals in protecting the natural resources of our region. The *Bays Plan* called for the Coastal Bend Bays & Estuaries Program, Inc. (CBBEP) to initiate a comprehensive monitoring and assessment program to meet this stated objective. Entitled, the Regional Coastal Assessment Program (RCAP), this baseline-monitoring program, conducted by the Center for Coastal Studies (CCS) at Texas A&M University-Corpus Christi, significantly expanded on present monitoring efforts within the region. Utilization of the U.S. Environmental Protection Agency Environmental Monitoring and Assessment Program (EMAP) probability-based sampling design was to determine resource conditions, provide information to evaluate environmental policies, and to help identify any emerging environmental concerns before they became widespread problems. The EMAP sampling design, consisting of 244 stations sampled over two years, provided essential spatial and temporal components that focused on providing scientifically sound water quality, sediment quality, and biological data describing conditions of the coastal waters of the CBBEP region. As the first in a series of RCAP sampling events, data collected

allowed for precise localization of anthropogenic and natural influences within the CBBEP region with a greater resolution than previously seen through historical monitoring programs. The comprehensive understanding gained through this project continues to provide the tools required to protect, preserve, and enhance the unique estuarine and marine resources of our area.

Sediment Quality in Relation to the Macrobenthic Community in the Coastal Bend Bays & Estuaries Program study area. Alex X. Nuñez and Brien A. Nicolau, Center for Coastal Studies, Corpus Christi, Texas.

Sediment quality wad derived as part of the Regional Coastal Assessment Program (RCAP) study for the Coastal Bend Bays & Estuary Program in conjunction with the EPA National Coastal Assessment Program (NCA). Sampling during the summer of 2002 consisted of 50 randomly selected sites derived by the EPA's Environmental Monitoring and Assessment Program (EMAP). Analysis of the data included the characterization of the benthic community, into four community assemblages along with community measures of richness, density diversity, %pollution tolerant and %pollution sensitive species. Principal Component Analysis was performed on the sediment data in order to reduce the data set. The reduced contaminant PC scores along with the *A.abdita* 10 day survival test were correlated with the benthic community measures within the assemblages.

Impact Of A New Tidal Pass On Estuarine Benthic Macrofauna in Corpus Christi Bay, Texas – Progress update. Terry A. Palmer, Paul A. Montagna and Rick D. Kalke. University of Texas Marine Science Institute, 750 Channelview Drive, Port Aransas, Texas 78373.

Construction began to open Packery Channel, formerly a natural tidal inlet that has been closed since 1912. Our study goal is to perform a before versus after, control versus impact (BACI) sampling design to determine effects of the channel on benthic macrofauna. The aim of this current presentation is to verify the validity of the sampling design. This involves analyzing the first year's data of pre-open (before) sampling. Deep (> 1 m) and shallow stations (< 0.5 m) were sampled for physical and biological characteristics at both control and impact sites. Sediment and hydrographic

conditions are similar between the two sites. There are significant differences in both abundance and diversity between sites and among sample dates. Species composition of the stations and dates is divided into three distinct groups based on nonmetric multidimensional analysis. Similar species exist in all deep sites independent of time and site. Most shallow sites are similar although the two impact sites had different species composition for three months of the sampling period, which correlates with a huge growth explosion of the tanaidacean *Leptochelia rapax*. Initial results give evidence to predict that the control site is appropriate despite differences in abundance and biomass, and that difference in rates of change between the two sites will represent impact of the opening of Packery Channel.

Dermowatch: Current Status of Dermo Disease in Oysters of Texas Bays. Sammy M. Ray, Texas A&M University at Galveston; Tom Soniat, Nicholls State University; Enrique Kortright, Kortright Corporation; and Lance Robinson, Texas Parks and Wildlife Department.

Dermowatch is a web-based program for monitoring Dermo disease in oysters of the Gulf of Mexico. High rainfalls during 2004 and 2005 have resulted in marked salinity reduction in Texas bays. Data obtained through this program show a substantial reduction in Dermo disease in juvenile and commercial-sized oysters along the Texas coast. Several of the more saline Texas bays that have produced little, if any, commercial oysters for some time, have become commercially productive during the 2004-2005 oyster season. For example, West Bay of the Galveston Bay System (probably one of the hottest spots in the Gulf of Mexico for Dermo disease) is commercially productive during the current oyster season after many years of little commercial production. Results obtained through this program suggest that Dermowatch provides a timely and reliable tool for monitoring the health of Texas bays and estuaries with regard to freshwater inflow.

Temporal and Spatial Variability in Estuarine Ecosystem Function: Estimated using Net Ecosystem Metabolism. Marc Russell, University of Texas at Austin Marine Science Institute

The Texas Gulf of Mexico estuarine system is fairly unique in that each major bay system receives freshwater inflow from one or two major rivers. The precipitation gradient along the Texas coastline provides a natural experiment to compare net ecosystem metabolism on various spatial and temporal scales and during different freshwater inflow conditions. Precipitation along the Texas coastline decreases drastically from moderately wet conditions in northern watersheds to semi-arid conditions in southern watersheds. We hypothesized that net ecosystem metabolism in shallow water estuaries is variable on small spatial scales (meters) and daily temporal scales as a result of stratification events and changing irradiance levels. We also hypothesized that net ecosystem metabolism is variable on large spatial scales (kilometers) as a result of differences in watershed land use / cover and hydrology. We used Lavaca Bay, San Antonio Bay, Copano Bay, and Nueces Bay for measurement of net ecosystem metabolism at various spatial and temporal scales. Monthly field deployments, finished in December 2004, were used to test if significant differences exist in net ecosystem metabolism at the following scales: water column depth, intra-bay, and inter-bay spatial scales, and daily, monthly, and seasonal temporal scales.

The dissolved organic iodine species of the isotopic ratio of $^{129}I/^{127}I$: A novel tool for tracing terrestrial organic carbon in the estuarine surface waters of Galveston Bay, Texas. Kathleen A. Schwehr[1], Peter H. Santschi[1], and David Elmore[2], [1] Texas A&M University, Oceanography (schwehrk@tamug.edu); [2] AMS PRIME Lab, Purdue University (elmore@purdue.edu).

Variations in $^{129}I/^{127}I$ ratios were used to trace terrestrial organic carbon (tDOC) across an estuary because 1) iodine is biophilic, so ~ 40 to 75% of total iodine in fresh and coastal marine waters partitions into organic iodine, 2) $^{129}I/^{127}I$ ratios in tDOC were greatly elevated over those from marine systems since atmospheric emissions of ^{129}I from European nuclear fuel reprocessing facilities were mixed more quickly in the surface ocean, ~ 100-500 m in a decade, than the terrestrial system which mixed ~10 cm in 10-50 years, and 3) the oceanic contribution of ^{127}I (50 to 65 ppb) to the ratio

has a greater dilution effect than the ^{127}I from fresh waters (0.5 to 40 ppb). First, analytical techniques were developed for $^{129}I/^{127}I$ ratio determination in dissolved organic iodine (DOI), and the other iodine species, utilizing dehydrohalogenation, anion chromatography, high performance liquid chromatography (HPLC) and Accelerator Mass Spectrometry (AMS). Then these novel techniques were applied to samples from a salinity transect across Galveston Bay, Texas. Results indicate that $^{129}I/^{127}I$ ratios in DOI from terrestrial sources are elevated in the upper estuary up to a salinity of ~ 20, similar to a behavior previously described for this estuary by Guo et al. (2003) for stable isotopic signals for dissolved organic matter. $^{129}I/^{127}I$ ratios in the inorganic iodine species did not show this feature, indicating fast isotopic and chemical equilibration between the two isotopes among the inorganic species in the estuary. These results thus provide proof of concept that $^{129}I/^{127}I$-DOI can serve as a tracer for tDOC in the coastal zone. - POSTER

Enhancement of Southern Flounder (*Paralichthys lethostigma*) in Texas Coastal Waters: Planning for a New Challenge. P. Silva, R. R. Vega and I.R. Blandon. Texas Parks and Wildlife Department, Coastal Fisheries Division

The southern flounder, *Paralichthys lethostigma*, is an important recreational and commercial species in Texas coastal waters. This flatfish has long been one of the top three targets of sport anglers on the Texas coast, behind only spotted seatrout and red drum. Declines in southern flounder's relative abundance have prompted TPWD to implement a management plan for this species that includes a fishery-independent monitoring program, more stringent fishing regulations and restrictions on harvest, habitat protection laws, and more vigilant law enforcement. In addition, the agency recently has initiated efforts to hatchery-rear juvenile southern flounder for purposes of stock enhancement. Protocols to culture flounder in grow-out ponds are currently being optimized. The primary goal of the effort is the development of capability for culturing this species on a large-scale basis so that there is flexibility in responding to changing management needs (e.g., stocking to compensate for year class failures owing to catastrophic events such as cold-kills). Critical questions that must be answered include does stock enhancement work with this species, how should southern flounder be released to maximize growth and survival, and what are the effects of released fish on recruitment and genetic diversity of the wild stock. Research

into those questions will determine whether supplemental stockings of southern flounder by TPWD can play a significant role in the overall management strategy for this species.

Toward integrated ecological coastal water quality monitoring in Texas: The Good, The Bad and The Ugly. James Simons, Texas Parks and Wildlife Department, Corpus Christi, TX

The science of environmental and ecological monitoring today is overcome with buzzwords such as ecosystem health, integrated ecological monitoring, biodiversity, ecosystem based management, ecological integrity, and so on. We appear to be at a crossroads, as many are calling for a more holistic approach to monitoring and assessing ecological parameters. Part of the problem toward achieving this goal is that in most, if not all state governments and the Federal government, there is a separation of various programs associated with water quality monitoring, into multiple agencies, some of whom seldom if ever talk to one another, let alone collaborate or share data. The fact that, in many states in the National Coastal Assessment program, the fish and wildlife agency is collecting water and sediment quality data intended for 305(b) reporting, with little communication or data sharing with their sister environmental quality agency, is but one example. As a need for integrated monitoring is recognized and understood by stakeholders, scientists and legislators alike, and new directives come down from on high, progress will be made.

Effects of hydrology and urbanization on the abundance and distribution of shorebirds on the Ella Barnes Wetland, Oso Bay, Corpus Christi, Texas. Leslie C. Smith, Elizabeth H. Smith, and Kim Withers; Center for Coastal Studies, Texas A&M University-Corpus Christi

Tidal flats in the Texas Coastal Bend region are important for many Western Hemisphere migrating shorebirds. A large portion of the Oso Bay watershed has been increasingly urbanized within the city limits of Corpus Christi, resulting in increased freshwater and saltwater effluent. The purpose of this study was to determine

shorebird abundance and habitat distribution on the Ella Barnes Wetland during spring and fall, and five wetland sites around Oso Bay Bridge in fall. Birds were censused using 15-minute point counts every 7-10 days from February 2004 to February 2005. Thirteen species of shorebirds (n=1122) were observed throughout the study period, compared to 26 (n =34,822), 25 (n=7254), and 28 (n =16,942) in the other tidal flat studies (lower Oso Bay) in 1985-1986, 1991-1992, and 2002-2003, respectively. Small shorebirds and killdeer were most abundant in this study, whereas small shorebirds and dowitchers were more predominant in the previous studies. Using Bray-Curtis Cluster Analysis shows the most similarities in studies conducted at the same sites (1991and 2002) and the Ella Barnes wetland study the least. Hydrology alterations via increased freshwater and saltwater effluents may have a negative effect on tidal flats in upper Oso Bay.

Variables affecting dissolved oxygen in Laguna Madre, Texas.
Jacqueline E. Staggs and Kim Withers, Center for Coastal Studies at Texas A&M University – Corpus Christi.

Controlled by both biotic and abiotic factors, dissolved oxygen (DO) plays a significant role in supporting aquatic life and represents a major component of overall water quality. To determine the relationship of DO to abiotic and biotic variables, temperature, salinity, community metabolism and DO were measured March – October 2004 at six stations in Laguna Madre, Texas. Community metabolism (oxygenic photosynthesis vs. aerobic respiration) of the water column was determined by calculating changes in DO using initial, light and dark bottle treatments where light and dark bottles were incubated 24 h *in situ*. Two methods to measure changes in DO were compared: a modified Winkler titration (Strickland and Parsons, 1972) and YSI 58 oxygen meter equipped with a YSI 5905 BOD probe. - POSTER

Community Wetland Bird Study Of The Black Point Wetland Complex, Refugio Co., Texas. Jennifer L. F. Stephens and Elizabeth H. Smith, Center for Coastal Studies, Texas A&M University-Corpus Christi, Corpus Christi, TX 78412, USA

Black Point wetland complex is located southwest of Bayside, Texas, in Refugio County. This wetland complex receives fresh water from rain and runoff from the Aransas River, and tidal water from Copano Bay, a secondary bay in the Aransas Bay system. Several resident and migratory wetland bird groups, including shorebird, wading bird, and waterfowl, utilize the wetland complex at varying times of year and under different hydrologic conditions. The wetlands are being acquired by the Coastal Bend Land Trust, and is a proposed Texas National Estuarine Research Reserve (TxNERR) monitoring site. No comprehensive studies have been conducted on wetland bird usage of the Black Point wetland complex or in the general geographic area; therefore, the objective of this study is to document wetland bird dynamics of the Black Point wetland complex. Wetland bird surveys are being conducted twice monthly from August 2004 –August 2005. During each survey, wetland bird locations are documented on a map of the area and behavior noted. Analyses of preliminary results are currently underway to evaluate both spatial and temporal use of microhabitats within the wetland complex. The results of this study will be useful to the Coastal Bend Land Trust in the management of these wetlands, as well as provide a reference site within the TxNERR area. - POSTER

Artificial Neural Network modeling for Texas bays and estuaries.
Philippe E. Tissot, Division of Nearshore Research, Texas A&M University-Corpus Christi.

Corpus Christi Bay as well as a large portion of the Texas Bays, Estuaries and the open coast are home to one of the most densely populated combination of coastal ocean observation networks. This growing availability of real-time data and extensive and consistent environmental time series is a fertile ground to develop new modeling techniques. Artificial Neural Networks is a relatively new modeling technique for environmental systems. When existing time series encompass most encountered conditions the models can be trained to quantify relationships between past observations and future outcomes. For cases such as point/local forecasts these models can have significant advantages over other models such as classic statistical models and Finite Element/Finite Differences models. These advantages include the ability to model non-linear relationships and the implicit inclusion of the boundary conditions and forcing functions. Also once the models are trained ANN based predictions

are computed virtually instantly. The TAMUCC Division of Nearshore Research (DNR) has developed and implemented models to forecast in real-time water levels and storm surges for the coast of Texas. Other models under development include more sophisticated ANN water level forecasts based on atmospheric predictions, a model to predict indicator bacteria counts in coastal recreational waters and models to forecast spring flows and water levels in a karst aquifer. Water level forecasts and more information on the models can be accessed at the DNR website at http://lighthouse.tamucc.edu/.

Refinements of a sediment chlorophyll analysis method. Ruben Trevino and Hudson DeYoe. Center for Subtropical Studies and Biology Dept., University of Texas – Pan American, Edinburg, TX.

Accurate quantitative analysis of chlorophyll from sediments especially those containing cyanobacteria can be difficult to achieve. The extraction efficiencies of three solvents (acetone, methanol, dimethyl formamide) were compared. The effect of light, temperature, and extraction time were also examined in an effort to develop an efficient and convenient protocol. - POSTER

Hydrophobicity of nano-scale colloids in aquatic systems. Laura Truxal, Kathleen A. Schwehr, Peter H. Santschi; Texas A&M University, Marine Science, Laboratory for Oceanographic and Environmental Research

Particulate material is an important component of aquatic systems because of its crucial role in the cycling of elements, vertical flux of the water column, and transport of trace elements and pollutants. When these colloidal particles coagulate into sinking aggregates, they can remove trace substances such as metals from the water column. Colloidal particles are rich in exopolymeric substances (EPS). EPS are fibrillar polymers, containing acid polysaccharides (APS) and proteins, released by phytoplankton and bacteria. The purpose of this project is to determine the relative hydrophobicity as a measure of the "stickiness" of model-APS and EPS colloids.

The methods for this research have included comparison of relative hydrophobicity measurements obtained from two independent techniques, calculation and experimental determination of octanol-water partitioning coefficients (K_{ow}) using radiolabeling and fluorescent probe techniques. On a relative scale, the experimental results follow the calculated values of hydrophobicity for the protonated rather than deprotonated species of APS, suggesting conformational reasons. New methods using high performance liquid chromatography are being developed to test our hypothesis, which states that the relative hydrophobicity, as related to the protein content and the hydrophobicity parameters determined from this research, can be used to predict extent and rate of flocculation and aggregation. Data from this research will contribute to a better understanding of the role of EPS in particle cycling, global carbon cycling, and trace metal and pollutant scavenging in aquatic systems, as well as actinide stabilization in ground waters.

Texas Seashells- A New Illustrated Guide. J.W. Tunnell, Jr., N.C. Barrera, R. Davenport, D. Hicks, and J. Andrews. Center for Coastal Studies/ Harte Research Institute/ Texas A&M University-Corpus Christi. nbarrera@falcon.tamucc.edu

The last comprehensive work on Texas seashells was compiled by Jean Andrews over 30 years ago (1971, 1977). Her book *Shells and Shores of Texas* describes approximately 350 species of molluscs. In a collaborative effort, we are preparing an updated and expanded book on Texas seashells. Presently, the list of molluscs in the marine environments of Texas equals over 1400 species from the estuarine shoreline to the deep Gulf of Mexico. Because of the large number of species and inaccessibility of many of these molluscs, principally from older collections of offshore deep water habitats, accounts of molluscs with descriptions and photographs will be confined to habitats not exceeding 18 m (60 ft), but will also include Stetson Bank and the Flower Garden Banks. Approximately 750 species of molluscs are known from these habitats, and will be individually illustrated and described in the book. A complete checklist of all species including depth ranges and habitat will be included in the book along with a research history of conchology/malacology in Texas, biology and ecology of classes and families of molluscs, and favorite collecting habitats and localities. - POSTER

Using Geographic Information Systems & Multi-Criteria Evaluation to Rank Oil and Gas Leases in Texas State Coastal Waters. Bianca D. Whitaker, Sarah P. Bernhardt, Himanshu Grover, Zhenghong Tang, Colin Spence & Samuel Brody, Texas A&M University, College Station.

There has been little or no application of multiple criteria decision making and spatial decision support systems tools to evaluate potential sites for oil and gas leases on the coastal zone. We developed and evaluated the usefulness of a site suitability measurement tool to determine the most suitable locations for oil and gas production activities in the coastal margin of Texas. All leased blocks on the Texas coast were given a Cumulative Value Score (CVS) based on eight positive values: aesthetics and access, biodiversity and critical habitat, coastal development, commercial fishing and bio-productivity, historical or cultural sites, marine transportation, recreation and tourism, and research and education. The range of scores was 0 to 2.75, with a possible maximum of 8.0. The scores were significantly different when comparing offshore and inshore areas. They were also significantly different when comparing northern to southern coastal bays. This tool might be modified and used to aid decision-makers in determining the most suitable sites, those with significantly lower use conflicts, for exploiting almost any natural resource. Maps highlighting CVS results and statistical results are presented. –POSTER

Coastal Zone Laboratory (CZL) and Laboratory for Oceanographic and Environmental Research (LOER). Texas A&M University at Galveston http://loer.tamug.tamu.edu

What Is LOER ? The Laboratory for Oceanographic and Environmental Research (LOER) was organized in 1989 at the Fort Crockett Campus of Texas A & M University in Galveston as a research facility associated with the Department of Marine Sciences (TAMUG/TAMU faculty) and the Department of Oceanography (TAMU graduate students). Numerous research scientists, postdoctoral investigators, graduate and undergraduate students, and staff interested in marine and aquatic environmental research have used LOER facilities. Currently,10 Ph.D. and 12 M.S. students who received graduate degrees at Texas A&M University have carried out their research work using LOER facilities.

Mission Statement. Provide state of the art common access analytical facilities and support for coordinated research efforts in oceanographic and environmental research- POSTER

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